भारतीय मानक

खडंजा डालने के लिए डामर — विशिष्टि

(चौथा पुनरीक्षण)

Indian Standard

PAVING BITUMEN — SPECIFICATION

(Fourth Revision)

ICS 93.080.20

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

April 2013 **Price Group 1**

Bitumen, Tar and Their Products Sectional Committee, PCD 6

FOREWORD

This Indian Standard (Fourth Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Bitumen, Tar and Their Products Sectional Committee had been approved by the Petroleum, Coal and Related Products Division Council.

This standard was first published in 1950 as 'Specification for asphaltic bitumen and fluxed native asphalt for road making purpose' which was revised in 1961 to change the grades of material and incorporate the methods of test as per 1S 1201 to IS 1220 : 1958 'Methods for testing tar and bitumen'. In the first revision, the grades of fluxed native asphalt were deleted and essentially the paving grades were introduced.

Based on the revised methods of test in IS 1201 to IS 1220 : 1978 'Methods for testing tar and bituminous materials (*first revision*) and the additional data that had become available, second revision was formulated in 1992. Bituminous mixes prepared with binders having high wax content have tendencies to become brittle in cold weather and to bleed in hot weather. Accordingly, in the second revision, separate tables of requirements of paving grade bitumen derived from waxy crude and non-waxy crude were prepared. Requirements of performance tests like penetration ratio, paraffin wax content, and viscosity at 60°C and 135°C and retained penetration after thin film oven test were incorporated. Besides, six grades of bitumen derived from waxy crude were unified into four grades and in the case of bitumen from non-waxy crude, an additional grade of 50/60 penetration was introduced on the basis of the data made available from a study carried out jointly by the Central Road Research Institute and the Indian Oil Corporation (R&D) Centre, Faridabad.

In the third revision in 2006 grading of bitumen was changed from penetration grade to viscosity grade. The variability in performance at high temperatures can be addressed by adopting a viscosity-graded bitumen specification (based on viscosity at 60°C) *in lieu* of the penetration-graded specification (based on penetration at 25°C). Four grades of bitumen based on the viscosity values were presented.

Adoption of viscosity-graded paving bitumen specification also reduced the number of total tests to seven, resulting in reduced cost of testing paving bitumen. This also eliminated empirical tests/parameters such as, penetration ratio, paraffin wax content, and Fraass breaking point without compromising the quality of bitumen.

In this fourth revision, increased emphasis is given to the viscosity measurement at 60°C and hence viscosity ranges are provided for all the grades. Also, instead of a range for penetration as specified in the third revision, minimum value of penetration at 25°C is stipulated. This revision has also rationalized the binder selection process by categorizing the binder grade based on design maximum air temperature. Hence, the choice of the grade depends upon the design maximum air temperature of the location where the binder has to be used. For each grade of bitumen, the range of viscosity values and minimum penetration value at 25°C are specified. Ductility test is no longer mandatory for specification compliance.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

PAVING BITUMEN — SPECIFICATION

(Fourth Revision)

1 SCOPE

This standard prescribes the requirements of various grades of paving grade bitumen for use as binders in the construction of pavements. Bitumen is graded by viscosity at 60°C.

2 REFERENCES

The following standards contain provisions, which, through reference in the text, constitute provisions of this standard. At the time of publication the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

IS No.	*Title*
334 : 2002	Glossary of terms relating to bitumen and tar (*third revision*)
1201 : 1978	Methods for testing tar and bituminous materials: Sampling (*first revision*)
1203 : 1978	Methods of testing tar and bituminous materials: Determination of penetration (*first revision*)
1205 : 1978	Methods for testing tar and bituminous materials: Determination of softening point (*first revision*)
1206	Methods for testing tar and bituminous materials: Determination of viscosity
(Part 2) : 1978	Absolute viscosity
(Part 3) : 1978	Kinematic viscosity
1208 : 1978	Methods for testing tar and bituminous materials: Determination of ductility (*first revision*)
1216 : 1978	Methods for testing tar and bituminous materials: Determination of solubility in carbon disulphide or trichloroethylene (*first revision*)
1448 [P : 69] : 1969	Methods of test for petroleum and its products: [P : 69] Flash and fire point by cleaveland (open) cup

3 TERMINOLOGY

For the purpose of this standard, the definitions given in IS 334 and the following shall apply.

3.1 Viscosity Ratio — It is the ratio of viscosity of residue from rolling thin film oven test to unaged bitumen, both measured at 60°C.

4 DESCRIPTION

Bitumen shall be prepared by the refining of crude petroleum by suitable methods.

5 GRADES

Bitumen shall be classified into four grades based on the viscosity, and suitability recommended for maximum air temperature as given below:

Grade	*Suitable for 7 day Average Maximum Air Temperature* °C
(1)	(2)
VG10	< 30
VG20	30-38
VG30	38-45
VG40	> 45

NOTE — This is the 7 day average maximum air temperature for a period not less than 5 years from the start of the design period.

6 REQUIREMENTS

6.1 The paving bitumen binder shall be homogenous and shall not foam when heated to 175°C.

6.2 The various grades of bitumen shall conform to the requirements prescribed in Table 1.

7 SAMPLING AND CRITERIA FOR CONFORMITY

7.1 Lot

In any consignment, all the containers of paving grade bitumen binders of same category and grade from the same batch of manufacture shall be grouped to constitute a lot.

7.2 The number of containers to be selected at random from the lot shall depend upon the size of the lot given in Table 2.

7.3 From each of the containers selected in **7.2** an average sample representative of the material in the container shall be drawn in accordance with the methods prescribed in IS 1201, taking all the

Table 1 Requirements for Paving Bitumen
(*Clause* 6.2)

Sl No.	Characteristics	Paving Grades				Method of Test, Ref to
		VG10	VG20	VG30	VG40	
(1)	(2)	(3)	(4)	(5)	(6)	(7)
i)	Penetration at 25°C, 100 g, 5 s, 0.1 mm, *Min*	80	60	45	35	IS 1203
ii)	Absolute viscosity at 60°C, Poises	800-1 200	1 600-2400	2 400-3 600	3 200-4 800	IS 1206 (Part 2)
iii)	Kinematic viscosity at 135°C, cSt, *Min*	250	300	350	400	IS 1206 (Part 3)
iv)	Flash point (Cleveland open cup), °C, *Min*	220	220	220	220	IS 1448 [P : 69]
v)	Solubility in trichloroethylene, percent, *Min*	99.0	99.0	99.0	99.0	IS 1216
vi)	Softening point (R&B), °C, *Min*	40	45	47	50	IS 1205
vii)	Tests on residue from rolling thin film oven test:					
	a) Viscosity ratio at 60°C, *Max*	4.0	4.0	4.0	4.0	IS 1206 (Part 2)
	b) Ductility at 25°C, cm, *Min*	75	50	40	25	IS 1208

precautions mentioned therein. All these samples from individual containers shall be stored separately.

7.4 Number of Tests

7.4.1 All the individual samples shall be tested for absolute viscosity at 60°C, penetration and softening point tests.

7.4.2 For the remaining characteristics, a composite sample prepared by mixing together equal quantities of paving grade bitumen, sampled, as the case may be, from all individual samples taken from each sample container, shall be tested.

7.5 Criteria for Conformity

7.5.1 The lot shall be considered as conforming to the requirements of this standard, if the conditions mentioned under **7.5.2** and **7.5.3** are satisfied.

7.5.2 From the test results of absolute viscosity at 60°C, penetration and softening point, the mean ($\bar{x}$) and the range (R) shall be calculated. The following conditions shall be satisfied:

a) [$\bar{x}$ –0.6R] shall be greater than or equal to the minimum specification limit specified in Table 1, and

b) [$\bar{x}$ + 0.6R] shall be less than or equal to the maximum specification limit specified in Table 1.

7.5.3 The composite sample when tested for the characteristics mentioned in **7.4.2** shall satisfy the corresponding requirements of the characteristics given in Table 1.

8 PACKING AND MARKING

8.1 Packing

Bitumen of all types shall be suitably packed in a container as agreed to between the purchaser and the supplier.

8.2 Marking

Each container of viscosity grade bitumen shall be legibly and indelibly marked with the following:

a) Manufacturer's name or trade-mark, if any;
b) Month and year of manufacture;
c) Type of material and grade; and
d) Batch number.

8.3 BIS Certification Marking

The container may also be marked with the Standard Mark.

8.3.1 The use of Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act*, 1986 and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of the Standard Mark may be granted to manufactures or producers may be obtained from the Bureau of Indian Standards.

Table 2 Scale of Sampling
(*Clause* 7.2)

Sl No.	Lot Size	No. of Containers to be Selected
(1)	(2)	(3)
i)	Up to 50	3
ii)	51-150	5
iii)	151-500	7
iv)	501 and above	10

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Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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